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Conventional Themes in Science Fiction

David Paul Nord

One of the most pervasive forms of popular literature is journalism. Yet popular culture researchers have generally neglected journalism and non-fiction, while mass communication researchers have generally neglected the popular literary aspects of journalism. This lack of overlap between the two similar fields of study is unfortunate and is part of the cause of a less than satisfactory understanding of the cultural role and function of journalistic literature. The research reported on here is a preliminary attempt to use popular literary concepts of convention and formula in a longitudinal study of one form of popular journalism: newspaper science writing.

Most scholarly studies of science writing have been conducted by journalism and mass communciation researchers concerned with the problems of communicating complex science news to the general newspaper reading public. Many surveys and experiments have been conducted over the years in an attempt to find out who does and who doesn't read science news and why or why not.[1] The central problem of science writing, of course, is to make complicated, technical concepts clear, simple and attractive enough for the average layman to read and to understand. That is the challenge for every newswriter, but it is particularly difficult for the science writer. In some of the most recent research in this area, which carries on the work of past studies, G. Ray Funkhouser and Nathan Maccoby as well as James Grunit have discussed a number of variables related to readability and audience comprehension in science writing. Some techniques for science communication suggested by Funkhouser and Maccoby include use of analysis and examples, use of "simplified" writing, discussion of practical implications, and so forth.[2] Grunig downplays the importance of style alone, stressing instead the need for content "relevant to the perceived situations of the reader."[3]

Researchers in this area, however, have generally ignored one of the most important variables in readibility and audience comprehension and interest: the use of conventional themes. The idea of convention and formula has been elaborated in some detail by John Cawelti and other researchers in popular literature and culture, but has been little used by students of journalism.[4] Briefly, the role of conventional forms in literature is to ease the impact of new material. If a writer doesn't include a large number of conventional experiences and situations, the reader will suffer a strain on his sense of continuity and order. (This idea is in many ways analogous to the concept of redundancy in information theory.) In no other form of writing, perhaps, is this more important than in the communication

of science and technology, where so much is necessarily so new to the reader.

The aim of the present study, therefore, is to look at the role of conventional themes and formula in newspaper science writing over time. The hypothesis was that science writers in the twentieth century have tended to deal with their subject matter in conventional ways notwithstanding changes in specific subject. Popular science writers have used—probably unconsciously sometimes—conventional themes as a technique for maintaining audience familiarity and attention in the face of the scientific explosion of the twentieth century.

It is important at the outset to note the differences between theme and subject, as I am using the terms here. Of course, science subjects have changed radically. It is hardly surprising that there were more stories about atomic energy and aviation in 1950 than in 1900. The interesting and more important question, however, is whether or not stories in 1900 and 1950 were handled in the same conventional ways, regardless of subject changes. And this is the question that has been largely ignored.

For example, one of the most widely recognized conventional themes used regularly by science writers is the general theme of "scientific breakthrough." Victor Cohn, a prolific and insightful science writer, has clearly recognized this tendency. He writes: "We science writers, except for an exceptional few, fail to pay enough attention to basic research, and we too often fire out news of new discoveries of what we call discoveries, without connecting them with the main body of knowledge and the basic work that has gone before. We over-use a bagful of cliches, like 'major breakthrough' and 'giant step forward'."[5]

There are surely many ways of looking at formula and convention in science writing. The study reported here was essentially a pilot project to search for conventional themes—if they do exist. It was not a formal research project to test systematically specific hypotheses. I looked at a sample of Sunday newspapers, since Sunday has generally been the big day for science news and features. The stratified random sample included all the science stories in 12 Sunday editions, one issue per month, from each of the following newspapers for each of the following years: *The New York Times*, 1900, 1935, 1965; *The New York World*, 1900; *The New York Mirror*, 1935; and *The New York Daily News*, 1965. The ideas was to look at the *Times* in three different periods, along with a popular newspaper from New York City, which has always been a center of science journalism. Thus, I read 72 editions of the newspapers which contained 466 science stories.

Of course, lots of things might be classified as a science story—and various content analysts have taken their turns at trying to formulate definitions and categories. I defined science news as stories dealing with man's relationship with the physical and biological worlds—stories ranging from pure scientific research to applied research, medicine and engineering. Excluded from the study were natural disasters (except disease, which is included), pure nature lore, routine weather, wildlife, gardening and farming stories, as well as science industry, business and marketing. Actually, for the purposes of this study, it is not really important where the line is drawn.

What I was interested in is if these randomly selected science stories exhibit conventional themes and if these themes ever changed. I found that a large proportion of the science stories I read dealt with medicine, with exploration and with technology. With this in mind, I set up the 14 thematic categories listed in Table 1. Of course, these categories are somewhat arbitrary. But unless a story fairly clearly fit into a specific category, it was placed into one of the "other" slots. With this procedure, a satisfactory level of intercoder reliability was achieved.

Table 1

—Conventional Themes—

I.	Medicine
	1. disease—non-cure
	2. cures and medical breakthroughs
	3. other medical stories
II.	Exploration
	4. discovery
	5. adventure or human interest
	6. other exploration stories
III.	Technology
	7. technology as servant
	8. technology as a problem
	9. other technology stories
IV.	Other Science Stories
	10. knowledge breakthrough
	11. science as unfinished process
	12. other science stories
V.	"Non-Science" Science Stories
	13. science meetings, clinics, etc.
	14. pseudo-science, astrology, etc.

The quantitative results of the study are summarized in Tables 2 and 3.

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Table 2

—Formula Themes Classified by Paper and Year—

(Shown as percentages of all science stories in each sample year for each newspaper. Twelve Sunday issues of each paper in sample.)

Conventional Themes	Times 1900	World 1900	Times 1935	Mirror 1935	Times 1965	News 1965
I. Medicine						
1. disease—non-cure	26.2	14.7	2.0	0	5.6	3.7
2. cures and med. breakthroughs	7.0	13.2	8.8	10.3	12.7	3.7
3. other medical stories	2.4	8.8	2.7	6.9	9.5	31.5
II. Exploration						
4. discovery	7.0	2.9	4.0	3.4	13.5	3.7
5. adventure or human interest	4.8	5.9	6.1	3.4	15.8	18.5
6. other exploration stories	0	1.5	4.7	0	12.7	5.6
III. Technology						
7. technology as servant	16.7	20.6	29.2	41.8	5.6	5.6
8. technology as a problem	7.0	4.4	2.7	0	10.5	5.6
9. other technology stories	2.4	0	2.0	6.9	3.8	1.9
IV. Other Science Stories						
10. knowledge breakthrough	2.4	2.9	13.6	0	4.8	0
11. science as unfinished process	2.4	1.5	6.8	3.4	2.4	0
12. other science stories	9.5	5.9	7.5	10.3	1.6	0
V. "Non-Science" Science Stories						
13. science meetings, clinics, etc.	0	4.4	8.2	0	0.8	16.7
14. pseudo-science, astrology, etc.	11.9	13.2	1.4	13.8	1.6	3.7
TOTAL	100%	100%	100%	100%	100%	100%
N	(42)	(68)	(147)	(29)	(126)	(54)

Though the quantitative results are anything but "hard data," because of the subjectivity of the thematic content categories and the small New York sample, they are, I think, suggestive. Most striking perhaps is the fact that the number of science stories in the sample hardly increased at all from 1935 to 1965. In the 1900 sample, there were 110 science stories, in 1935 there were 176, and in 1965 there were 180. The number of science stories in the *Times* sample actually fell from 1935 to 1965. The main reason for this is that the *Times* of 1935 carried many small items, while the *Times* of 1965 had more, in-depth reporting. That is a typical problem of content analysis, of course, but it is probably not a very serious one for this sort of exploratory study.

The most interesting finding, perhaps, is that the data seem to confirm a general stability of formula themes over time—but with a few interesting changes. "Disease—non-cure" stories, for example, fell dramatically as might be expected, from 19.1% of the 1900 stories to 1.7% in 1935 and 5.0% in 1965. Meanwhile, "cure" stories stayed around 10% in all three years. In the area of exploration, both "discovery" and "adventure and human interest" themes were up in 1965, due almost totally to the space program. The year 1935 showed the highest percentage of "technology as man's servant" stories; with 31.3% of all the stories that year, compared to 19.1% in 1900 and 5.6% in 1965. Not surprisingly, 1935 was the lowest in "technology as a problem" stories.

This focus on conventional themes suggests a general formula of

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Table 3

—Formula Themes Classified by Year—

(Shown as percentages of all science stories in each sample year for both newspapers together in each year. Twenty-four Sunday issues of two newspapers per year in sample.)

Conventional Themes	1900	1935	1965
I. Medicine			
1. disease—non-cure	19.1	1.7	5.0
2. cures and med. breakthroughs	10.9	9.1	10.00
3. other medical stories	6.4	3.4	16.1
II. Exploration			
4. discovery	4.5	4.0	10.6
5. adventure or human interest	5.5	5.7	16.7
6. other exploration stories	0.9	4.0	10.6
III. Technology			
7. technology as servant	19.1	31.3	5.6
8. technology as a problem	5.5	2.3	8.9
9. other technology stories	0.9	2.8	2.8
IV. Other Science Stories			
10. knowledge breakthrough	2.7	11.4	3.3
11. science as unfinished process	1.8	6.3	1.7
12. other science stories	7.3	8.0	1.1
V. "Non-Science" Science Stories			
13. science meetings, clinics, etc.	2.7	6.8	5.6
14. pseudo-science, astrology, etc.	12.7	2.3	2.2
TOTAL	100%	100%	100%
N	(110)	(176)	(180)

science writing. A large proportion of stories fall into the general categories of what might be called "Man the Master" of nature, science and technology, and "Man the Slave" of nature, science and technology. "Man the Master" includes the themes of perennial progress in science and the magic of the laboratory superman. Readers know ahead of time that worldly problems will evaporate before the steady march of science, just as they know the bad guys will fall before th march of the hero in a popular western novel. But the flip-side of this formula, "Man the Slave," has also been a fixture of popular science writing, from 19th century hoaxes about monsters from outer space to 20th century horrors of the atomic bomb, environmental decay and the popular explosion.

A general idea of the changes in the overall formulas of "Man the Master" and "Man the Slave" is given in Table 4. The "Man the Master" index is a composite of stories in five thematic categories: "medical cures," "exploration—discovery," "exploration—adventure and human interest," "technology as servant," and "science—knowledge breakthrough." The "Man the Slave" index is a composite of "diseases—non-cure" and "technology as a problem" stories. Of all the 1900 stories, 50.9% were "Man the Master," based on this index. This rose insignificantly to 53.9% in 1935 before falling a bit to 41.1% in 1965. Meanwhihle, "Man the Slave" stories accounted for 24.5% of the stories in 1900. This fell to only 3.9% in 1935, before rising somewhat to 13.8% in 1965. Quite a few stories not included in

these two indices also seemed to use these broad formulas. But these data do give some idea of the trends.

Table 4

—Man and Nature Indices—

(Shown as percentages of each index for each sample year. The "Man the Master" Index is the sum of thematic items, 2, 4, 5, 7 and 10 from Table 1. The "Man the Slave" Index is the sum of thematic items 1 and 8 from Table 1.)

Formula Index	1900	1935	1965
1. "Man the Master" Index	50.9	53.9	41.1
2. "Man the Slave" Index	24.5	3.9	13.8
3. Neither	24.6	42.2	45.1
Total	100%	100%	100%
N	(110)	(176)	(180)

To add some flesh to this statistical skeleton we must look at some of the stories themselves and at some of the specific uses of science formula writing in the 20th century.

The New York World of 1900 illustrates in classic form some of the major formula stories. On the first page of the first issue of the sample, a headline declared: "Man May Yet Live 250 Years, Metchnikoff Tells the World."[6] The subhead was "Paris Scientist in Sight of Serums to Keep Death at Bay." The story itself was less flashy, but the theme of "medical cure" is obvious. In general, the 1900 *World* carried a wide variety of cure stories, from the successful treatment of cancer patients by light rays to "astonishing cures" for TB patients simply by sleeping outdoors. One story even told about a man who had cured his 20-year-old case of rheumatism by eating and drinking nothing but milk.[7] The most popular kinds of science stories in the 1900 *World* turned on the theme of "technology as servant."

A typical story of this sort told about the "Noiseless Electric City of the Future."[8] The writer declared that "in the ideal city, distracting noises will be unknown, and dirt and all unclean things will be kept without its pale. Electricity is the magician that can and assuredly will work the change." Stories about the work of scientists were often filled with "startling announcements" or "wonderful results" or both, as was the case in an October story about studies into the origin of life.[9] But the *World* of 1900 was not all progressive science in the "Man the Master" mold. The first issue of the sample also introduced the "disease—non-cure" theme. With gruesome drawings of germs to go with it, the story told of women's long skirts which sweep up "DEADLY MICROBES." According to the lead, "Every woman who wears a gown of the fashionable length does so at the risk of her health."[10]

The New York Times of 1900 was not nearly as interested in science

reporting as was the *World.* A large percentage of the science stories in the *Times* that year (26.2%) were reports on epidemics and diseases. The *Times* also liked "technology as servant" stories, with 16.7% on this theme. These ranged from an account of the technological wonders of the London "tube" to a story about a new exercise machine with electricity in the elastic pull-cords. Overall, in science news as in other news, the *Times* was less flamboyant than the *World,* though it carried its share of formula stories.

The New York Mirror of 1935 is probably the champion science formula paper in this sample, though the *Mirror* did not carry a lot of science news—only 29 stories in the 12-issue sample. Twelve of these 29, however, used the "technology as servant" theme and three were "cure" stories. Every Sunday the *Mirror's* magazine section would describe "Science's Amazing New Creations to Change Our World," ranging from "made-to-order climate" to "undreamed of developments for the future" in medicine.[11] In typical *Mirror* hyperbole, the restoration of the bones of an ancient mammal threw scientists into a fit of "frenzied enthusiasm."[12] The *Mirror* also played on the "Man the Slave" formula in several stories. In one, an educator revealed "how the shifting pole-star and changing axis of the Earth foretell its Ultimate Doom."[13].

Science reporting in *The New York Times* of 1935 was largely the work of science editor Waldemar Kaempffert, a trained scientist and one-time managing editor of *Scientific American* and director of the Chicago Museum of Science and Technology. In his regular Sunday feature, "This Week in Science," Kaempffert extolled the virtues of technology, while also introducing more coverage of "pure" science and basic research. Most of his "pure" science stories carried "knowledge breakthrough" themes, often with explicit discussion of man's mastery over nature. In telling about studies of the upper atmosphere by balloon, Kaemffert said, "It is only in the last century or so that the wistful gaze of the explorer has turned upward to the clouds. With the invention of the balloon he ceased to be a two-dimensional animal in the sense that he was no longer limited to crawling over the surface of the globe."[14] One issue carried a whole collection of stories about the wonders of modern chemistry. Kaempffert wrote:

> As we look over the hundreds of reports, addresses, papers and abstracts which were presented before the American Chemical Society last week we cannot but be struck by the range of the chemist's interests and activities. Apparently there is nothing under the sun about which he cannot discover something new or which he cannot improve. Cranberry jelly and wind, wood and epilepsy, air-conditioning and sunburn—nothing escapes him.[15]

The New York Daily News of 1965 tended to use a lot of health tips and medical advice type stories, which were classified as "medical—other." The *Daily News* tended less than the *Mirror* of 1935 to play on themes of "technology as servant" and "medical cure." One of the *Daily News'* favorite themes was "exploration—adventure and human interest" in the space race. Little was ever said about the science processes or the economics and politics of the Gemini Project, except for one story suggesting that troubles on Gemini 4 may have been the result of trying to do too much too soon.[16] A typical example of the *Daily News'* space coverage was a story entitled "Racing to the Moon," which detailed the intricate and dangerous

steps expected when U.S. astronauts head for the moon.[17]. The *Daily News* did introduce an interesting example of the "technology as a problem" theme. It was a story about electronic bugging, and it warned that somebody may be listening to you right now.[18] That was indeed a subject foreign to 1900 and 1935.

The New York Times of 1965 no longer had Waldemar Kaempffert, but science writers such as Walter Sullivan and Harold M. Schmeck, Jr., continued the Kaempffert tradition. The *Times* of 1965, like the *Daily News,* carried many stories on the space program, tending to emphasize the "exploration—discovery" theme more than did the *Daily News*. Writing of a Mariner space probe of Mars, Sullivan said, "We may find that we have taken the first step toward making our biology a universal rather than a provincial science."[19] Writing about astronomy, Sullivan declared, "Man apparently stands on the threshold of understanding the basic nature of the universe."[20] Schmeck also found cosmic significance in many of the subjects he covered. In writing about Sealab 2, an undersea living experiment, Schmeck called it "of great potential importance to technology, science and perhaps ultimately to the welfare of man."[21] In one story, Schmeck performed a turnabout on the "medical—cure" theme, without quite scrapping it altogether. He wrote the following about the papers delivered at a cancer research seminar: "The reports last week disclosed no 'breakthroughs' against cancer, but only the steady, dedicated and sometimes painfully slow attack by medical scientists against one of man's great enemies."[22] The 1965 *Times* in general carried a much wider variety of stories than the other papers sampled. The 1965 *Times* also carried the only story in the sample which talked about environmental pollution being "a peril to the life cycle."[23]

All in all, the results of this little, preliminary study seem to indicate four things. First, formula in science writing has probably changed little thoughout the 20th century. Second, the major formula themes seem to be closely related to the progressive idea of science as the hope of mankind.[24] Third, science writing of 1935 stands out in this small sample as more attuned to themes of technological progress than either 1900 or 1965. Fourth, the science stories for this sample in 1965 seemed to be somewhat more concerned with themes of technology as a problem in science, which may be part of what some media observers identified as a movement beginning in the 1960s toward more critical science writing.[25]

The value of the formula approach to science writing is threefold: It tells us more about the nature of science writing over time than do studies of the subject matter of science writing. It suggests techniques for the analysis of news reporting in general. And it even hints at an important problem about science in society.

Surely we need to understand more about the role the popular science writer has played as a packager of cultural goods. David Burkett has described the science writer as "the ancient man beside an ancient campfire, recounting the tribal lore."[26] Has the tribal lore changed over time? Today many scientists and science writers fear the rise of an anti-science movement, with 48% of the respondents in a recent nationwide poll saying that science has actually caused some of society's problems.[27] Is this

new concern reflected in the formula of science writing in the mass media today? Are we moving from an age of "Man the Master" more to an age of "Man the Slave"—or to something altogether different? A large-scale study of the kind reported here might help to get at the answers to these questions.

The formula approach might also be useful for studies of other kinds of news reporting. Students of popular culture have generally neglected journalism in favor of popular fiction. Considering the central place of the newspaper in American life for the past 200 years, this seems an unwarranted neglect. Though ostensibly non-fiction, the literature of news reporting obviously embodies some of the conventional structures and formulas of pulp fiction. It is time we looked more carefully at the cultural role newspaper literature has played in American history.

A formula study of science writing might also suggest an insight into the nature of science itself and its relation to society. It seems that the development of popular science reporting in many ways reflects the development of our modern scientific culture. The first strong interest in science news in the American press came in the late 19th and early 20th centuries—the era of progressive science.[28] If the formulas of science news writing have changed little since then, this may say as much about science and society as about the peculiarities of American journalism. Jacques Barzun, in his perceptive study *Science: The Glorious Entertainment,* argues that the popular mind has been frozen into a 19th century, mechanistic idea of the universe which bears little resemblance to modern scientific thought. He says: "There has thus been no scientific revolution at large; that is, no completed revolution of the intellect caused by science. There has been rather a social revolution which has enthroned science in the name of increased production, increased consumption, increased population, and increased specialization."[29] If this is true, then perhaps part of the blame lies with the techniques for the popularization of science in the 20th century.

The conventions of science writing might be likened to the "paradigms" of science research, as portrayed by Thomas Kuhn.[30] "Normal science," as Kuhn describes it, proceeds within the confines of conventional theories and methods. Only rarely is it possible, or prudent, to discard the old paradigms for new ones. But sometimes it is necessary, and sometimes it happens. And that is a scientific revolution. Perhaps popular science writers need to discard or revise some of their old conventions and formulas in order to break the hold of the scientific past, as Barzun describes it. On the other hand, perhaps the use of formula and convention is an intelligent and completely logical approach to the popularization of science. What the truth is in this matter is beyond the scope of this paper. It would surely be fair to say, though, that before we can do anything, we need to know something about these conventions and formulas as they exist and have existed—ever since the 1830s when Ben Day's *New York Sun* first told us all about life on the moon.

Notes

[1]Much of this research is summarized in National Association of Science Writers, *Science, the News and the Public* (New York: New York University Press, 1958); Hillier Krieghbaum, *Science and the Mass Media* (New York: New York University Press, 1967); David Warren Burkett, *Writing Science News for the Mass Media* (Houston: Gulf Publishing Co., 1973); Kenneth Johnson, "Dimensions of Judgment of Science News Stories," *Journalism Quarterly*, XL (Summer, 1963), 315-22. The only general history of science news reporting is Hillier Krieghbaum, *American Newspaper Reporting of Science News* (Manhattan, Kan.: Kansas State College Bulletin, August 15, 1941).

[2]G. Ray Funkhouser and Nathan Maccoby, "Tailoring Science Writing to the General Audience," *Journalism Quarterly*, L (1973), p. 226.

[3]James E. Grunig, "Three Stopping Experiments on the Communication of Science," *Journalism Quarterly*, LI (Autumn, 1974), p. 399.

[4]See especially John G. Cawelti, *Adventure, Mystery, and Romance* (Chicago: University of Chicago Press, 1976). In the field of journalism research, William Stephenson follows this approach to some extent. See William Stephenson, *Play Theory of Communication* (Chicago: University of Chicago Press, 1967); and *Science: Symposium Series for Editors . . . Report, 1973*, William Stephenson, director (Columbia, Mo.: University of Missouri, School of Journalism, 1973).

[5]Victor Cohn, "Are We Really Telling People About Science?" *Science*, CXLVIII (May 7, 1965), p. 758.

[6]*New York World*, Jan. 7, 1900, p. 1.

[7]*New York World*, March 11, 1900, p. 7.

[8]*New York World*, Aug. 5, 1900, p. E5.

[9]*New York World*, Oct. 7, 1900, p. 7.

[10]*New York World*, Jan. 7, 1900, p. 7.

[11]*New York Mirror*, July 21, 1953, magazine pp. 10-11.

[12]*New York Mirror*, Nov. 17, 1935, magazine p. 6.

[13]*New York Mirror*, March 10, 1935, magazine p. 8.

[14]*New York Times*, Nov. 17, 1935, p. E10.

[15]*New York Times*, Aug. 25, 1935, p. XX7.

[16]*New York Daily News*, June 6, 1965, p. 3.

[17]*Ibid.*, pp. 98-99.

[18]*New York Daily News*, Sept. 5, 1965, p. 66.

[19]*New York Times*, July 23, 1965, p. 66.

[19]*New York Times*, July 23, 1965, p. E8.

[20]*New York Times*, Nov. 14, 1965, p. E7.

[21]*New York Times*, Aug. 15, 1965, p. E10.

[22]*New York Times*, April 4, 1965, p. E7.

[23]*New York Times*, Feb. 28, 1965, p. 68.

[24]For an elaboration of the concept of progressive science, see George H. Daniel, *Science in American Society* (New York: Alfred A. Knopf, 1971), pp. 290ff.

[25]See, for example, Lawrence Lessing, "The Three Ages of Science Writing," *Chemical and Engineering News*, XLI (May 6, 1963), 88-92; John Lear, "The Trouble with Science Writing," *Columbia Journalism Review* (Summer, 1970), 30-34; and Victor Cohn, "Are We Really Telling People About Science?"

[26]Burkett, *Writing Science News*, pp. 180-81.

[27]"Science Still in Public Favor," *Science*, CLXXXII (Oct. 26, 1973), p. 369. See also Lessing, "Three Ages of Science Writing."

[28]See Krieghbaum, *American Newspapers Reporting of Science News*. See also Daniels, *Science in American Society*, p. 308.

[29]Jacques Barzun, *Science: The Glorious Entertainment* (New York: Harper and Row, 1964), p. 24.

[30]Thomas Kuhn, *The Structue of Scientific Revolutions* (Chicago: University of Chicago Press, 1962).

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